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FAIRCHILD TROPICAL GARDEN

The Makapuno Coconut of the Philippines

The Story of the Coconut that Bears It
and Its Introduction into Florida

By
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COCONUT GROVE, FLORIDA

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WHEN I first saw Florida, in 1898, it was not the "land of the coconut palm." True, some coconut palms had been planted on Miami Beach and there were some scattered on the Florida Keys and a few had just been set out in the grounds of the Royal Palm Hotel, that first hotel of any considerable size which began the life of Miami as a hotel town. I recall that James Ingraham, then Vice President of the Florida East Coast Railway pointed these out to me with great pride. Only yesterday I watched the tractors as they levelled off the spot where those coconut palms stood in order to make a place for a sky-scraper of cement and steel. And so will be shut out from memory all traces of the loveliness which in that day, now nearly half a century ago, attracted the more venturesome northerners to the shores of Biscayne Bay; to the broad porches of the Royal Palm Hotel where they sat in the sun and wondered what kind of plants those were which had been so carefully set out along the waterfront. A usual inquiry of these early visitors was "how can you tell a coconut palm?" to which the reply came promptly, —"by their coconuts,—their nuts."

Coconut Grove, which at that time was larger than Miami, had only here and there a coconut palm, but the little grove by the waters edge which Commodore Munroe had planted near his boathouse seemed large enough then to have warranted its being given the name COCOANUT GROVE. It took a town meeting and much persuasion to get the Post Office in Washington to change the spelling and drop out the "a".

I give this sketch of those early days to emphasize the fact that we have travelled far since then and do not have to boast of having coconuts, for every reader of the Sunday newspapers knows that thousands of people are basking under their shade on our white bathing beaches.

The idea that there are varieties—different kinds—of coconut palms however, has not entered the consciousness of many of those who lie under them or who even go so far as to learn to open their nuts and drink the milk.

Yes, there are many sorts, kinds, varieties of coconuts that have been given native names in the various parts of the world where the coconut palm is grown. We need to be reminded, perhaps, that the coconut palm is one of the very great food plants of the world, nourishing with its oil-filled white meat many millions of tropical people, and with oil expressed from it helping to feed millions more who live outside the tropics.

On any tropical strand on the globe; any beach where temperatures do not go below freezing, a coconut palm is almost sure to be gracing the scene with its superb sweeping fronds, and on the sand below, will be children playing with the nuts. Along back from the coast on countless tropical islands stretch vast coconut palm plantations, monotonous perhaps to those who live on them but full of romance to visitors, for few creations of nature have a more persistent hold on the human imagination than has the coconut palm. And although there are so many varieties, yet as a species, *Cocos nucifera* stands alone without a single near relative in the world, and its native home remains a matter of speculation and argument.

In his remarkable book, "The Food Plants of the Philippines," P. J. Wester prints a list of some eighty varietal names, although he suggests that many of them may be duplicates. Yet, so far as I am aware, nowhere has there been gathered together a collection of these named coconuts with the idea of finding out which of them would come true to seed. And, unlike the orchard crops with which northerners are familiar, the coconut cannot be budded or grafted. It has only one immense bud which is concealed, covered completely with the bases of its great leaves and there would be no way to propagate from it. If its nuts do not "come true," any name which has been given to the mother palm will mean little, and only long experience can determine if it does come true.

So far, only a comparatively small number of them seem to reproduce themselves reasonably true to type. When one compares the amount of seed selection which has been done on the Maize, or Indian Corn plant, and the great increases in yield and in uniformity which have been secured, it is perhaps allowable to ask if something similar could not be done with the coconut. Instead of the usual mixed-variety plantings could we not have plantations as uniform in character as are the fields of hybridized, selected corn?

Only once have I ever been in a coconut plantation where its owner knew, or thought he knew, his various coconuts and believed they would come true to seed. This was in Ceylon, at a place named Marigama. I went there in 1901 to visit Mr. W. H. Wright who had made the only plantation of Mangosteens then in the island, and found he was growing coconuts also.

Mr. Wright was able to point out the vegetative as well as the nut characteristics of his palms, much as the date growers of Egypt later showed

me the differences between the various palms they were growing. But there was this striking difference between the two cases. The date palm suckers at its base, and from these suckers it can be propagated. The coconut palm does not sucker and there is no way to multiply it except through the planting of its seeds, and just how sure these were to "come true," as they say, Wright did not know from any extensive experimental plantings. From what might be called "general observation" he felt pretty sure that they would. I made a number of photographs of the named nuts: his Thambalie, Big Long, Big Commercial, Siam, Round Commercial, Rati or Red, Small Commercial, Small Long Shaped, Small Round, King, Jaffna, etc.

But in 1901 there was no more than a faint inkling of what tropical agriculture in this country might grow into, and the idea of introducing varieties of the coconut was not yet on our program.

It was years later that Mr. Wester left the Brickell Avenue Garden here in Miami and went to the Philippines and joined the Department of Agriculture which Dr. E. D. Merrill and a group of American scientists were building up. He spent many years in his Garden at Lamao and it was there he wrote "The Food Plants of the Philippines." Among the 86 named coconuts he mentions in particular the Makapuno or Kapuno as having a solid kernel of a soft sticky texture, appreciated by the Filipinos for making sweetmeats; the Tamisan with a sweet husk which is chewed as sugar cane is; the Nino and Dahili, two very dwarf, precocious varieties well adapted for planting in gardens; the Manipod, another early-bearing kind with small nuts and the Pugain with a small, oblong nut.

Whether the 80 odd sorts come true to seed he does not say, probably did not know, for cross pollination is the rule rather than the exception in the coconut, as it is in so many tropical fruits.

Let me try to outline in simple language the process by which the nuts of a coconut palm come into existence.

The first sign that a coconut palm is going to fruit is the appearance at the base of one of the leaves of a flattened yellowish green "bud" which grows to be a smooth, yellow boat-like structure nearly two feet long, something you want to put your hands on. This is the "flower spathe." In a matter of days, depending on the amount of moisture, this spathe splits open of itself and reveals inside a long bundle of ivory-white, slender, tapering "sticks" attached to a main stem, all most marvellously packed in together. It is so beautiful that it might have been the work of some ancient Chinese sculptor in ivory. So beautiful in fact that my friend Allison Armour used to decorate his table with one; shaking the tiny branches out carefully and setting the stem upright in a heavy vase. It looked like an exquisite ivory fountain. In the course of a few days the flowers would open, scattering their pollen over the table and at last fall away from the ivory stems that bore them.

These ivory stems are the spikes of male flowers. Sometimes as many as three hundred flowers sit securely on one of these stems. Towards the tip they are much crowded together, lower down they may be an inch apart.

Near the base of each one of these male stems or spikes a few acorn-like buds, an inch through, are generally to be found. These are the female flowers. Covered with overlapping scales almost to their tips, they yet leave exposed bare spots, each with a stigma in the center. This stigma is three parted and when it is ready to receive the pollen it glistens with a sticky fluid and there roll down over the bare spot drops of nectar from Nectaries around it which attract the bees and wasps and other insects.

The male flowers have six stamens and these arise out of a cup-like flower composed of three petals, below which are three small scale like sepals. In the center of these six stamens lies another stigma, but an aborted one; three parted, and in its three clefts are located nectaries which excrete their nectar even before these male flowers have really opened. That there is an abundance of nectar exuded is shown by the swarms of bees, wasps and flies which gather around each spathe as soon as it opens. The pollen is a light yellow powdery substance; each grain covered with a thin skin. When still dry the grains are folded and resemble somewhat in shape a grain of wheat but as soon as they are wet they swell up and become quite round.

There was for some time a misunderstanding about this pollen; it was thought that (like the pollen of the Date palm it was blown about by the wind and took its chances of finding the small stigmas of the female flowers. Through the investigations of the Dutch botanist, Dr. P. L. M. Tammes, whom I met in his "Klapperproefstation" (Coconut Experiment Station) near Menado, Celebes, in 1940, it has become evident that the coconut flower is dependent upon insects for its pollination. Only twenty meters away from an open flower cluster he hung up a series of glass slides covered with sticky vaseline and although there was a great abundance of pollen in evidence, after seven hours exposure he could find only four pollen grains on all five slides he had exposed.

With this kind of arrangement—female flowers at the base of long spikes and just above them three hundred or more of male flowers, it would seem almost obvious that the female flowers would be dusted with pollen from those flowers just above them. Be, in other words, close or self fertilized. But according to Tammes and other careful observers, this is not generally the case, because the female flowers do not become receptive, the stigmatic fluids do not appear on their stigmas, until after the male flowers that

The interior of two ordinary and two Makapuno coconuts. The Makapuno nuts are shown below. Their cavities are nearly filled with a soft, semi-transparent delicately-flavored material. They are produced as sports by certain trees called "Makapuno-bearers" or "Makapuno-throwers" and for some reason they appear to be unable to grow. Two ordinary coconuts, above. Photograph by J. Baylor Roberts taken on the De la Rama plantation, May, 1939. Courtesy of the National Geographic Society.

stand above them have shed their pollen. This applies generally, Tammas states, to the tall growing coconut palms but not to the dwarf kinds where often some male flowers are still shedding pollen when the female flowers become receptive.

I have gone into this detailed description because it has a bearing on the matter of coconut varieties not coming true to seed. Generally, Tammes says, they are cross-pollinated, but by enclosing the flowers in netting they can be made to self-pollinate their flowers and as a general rule self-pollinated nuts will come true to type.

It may seem strange that although the work of introducing tropical plants into Florida was begun in 1898 a wide search for varieties of so spectacular a palm as the coconut was not made at once. But it must be remembered that it was then a matter of general doubt if there were such things as distinct varieties which would come true to type. Also, no one in Florida was interested in testing a collection to see if they did vary, so the Office of Plant Introduction busied itself with avocado and mango varieties, which were known to come true to budwood.

It is true that in 1913 Robert Wilcox had sent us the Burica, or San Blas coconut, and in 1915 Dr. Pittier sent us more nuts of it, and we had a small collection from Samoa, but none of these seem to have lived.

The first important introduction of a coconut variety was in 1921, when the late W. J. Matheson financed the bringing in of the Malay Dwarf coconut from the Federated Malay States and established them on his Key Biscayne plantation. This was a joint enterprise with the Department of Agriculture, and its success gave Mr. Matheson much satisfaction. They can now be seen from Crandon Park, their gorgeous golden fruits decorating the whole landscape.

The King coconut, a favorite sort for drinking,

and the Nawasi, or Edible-husked (so-called because the lower part of the husk is eaten raw, as turnips are often eaten in the turnip field) I sent from Ceylon in 1926 when I was there on an Allison V. Armour Expedition. They are fruiting now at Chapman Field and in Colonel Montgomery's Palmetum.

When, however, in March, 1938, Colonel Montgomery made it clear that one of the features of the new Fairchild Tropical Garden was to be a large collection of palms, the question of different kinds of coconuts came into the foreground of our conversations. In one of our discussions Dr. Walter T. Swingle, one of the organizers of the new Garden, called my attention to the account he had read in the Philippine Journal of Agriculture of a solid-fleshed coconut called the Makapuno, by Juan P. Torres.

Dr. Swingle's finding of this quite remarkable paper was the prelude to a story of shifting scenes and many personalities; one that ran along for ten years, interrupted as it was by the great war. This play is without the hates and murders which made the introduction of the bread-fruit into the West Indies one of the "great stories of the sea." It is a quiet story, yet it involves a number of characters with their experiences and their fates and ends with the successful introduction of a new and striking kind of coconut into the Western Hemisphere where apparently it had never been seen before.

Here is the story. It begins in 1938 with a letter on yellow paper from Swingle which starts with this compelling paragraph, gleaned from Torres' article. "The meat (of the makapuno) is much thicker than in ordinary coconuts and is soft, the central space is filled with a viscous transparent liquid. The hard meat of the ordinary nut is 63.63% water while the soft meat of the makapuno nut is 71.59% water but it has a larger percentage of protein, 11.76% instead of 9.09% in ordinary coconuts. The makapuno nuts are preferred in Manila for sweets, ice cream, candy, etc. It is sold at 15 to 20 times as much as the ordinary coconut." He went on to explain that makapuno nuts do not germinate, probably because they contain no "milk," but there are certain trees recognized as makapuno-bearers which bear about two makapunos to every ordinary nut, and some of the normal nuts from such trees are pretty sure to produce makepuno bearing trees. That was enough to start the quest.

First—Who would put up the money, take chances on our being able to get this strange coconut? Of course I thought at once of Hugh Matheson, who had inherited, along with the plantation of Key Biscayne, his father's interest in coconuts. But it was summer, Hugh was away, and we went North to our summer home in Cape Breton Island. Then early one July morning I was awakened by noises below us on the Lake and looking down from The Lodge porch I stared into the upturned face of Hugh Matheson who had come in on his yacht "Paragon" during the night. In the course of one of our long talks I told him of the quest.

"Yes, indeed, I will put up a hundred dollars for the experiment," he said, "but," he added, "be sure you don't route them into New York, for if they arrive in cold weather they won't germinate."

The next question was: Who would get the nuts for us? I began making inquiries. Dr. Merrill said, "Why don't you try Hugh Curran, Professor of Forestry in Los Banos?" I had not been in the Philippine Islands since 1900, in the "Days of the Empire" at the beginning of the American occupation. My ideas of the scientific bureaus Merril and his associates had encouraged were very vague. But I knew Hugh Curran, for he had brought me once some seeds from Brazil.

So, as I had done so many times before, I took a shot in the dark and sent him a long explanatory letter. This was in September, 1938. I did this with some degree of confidence for Harry Edwards had told me that Curran was living not far from the place where Torres had said the makapuno grove was located.

As I wrote my letter, the nightmare of getting coconuts past the Federal Plant Quarantine arose and I recalled that my Ceylon coconuts—the King and the Nawasi—were not allowed entrance into Florida but had had to be sent to the Plant Introduction Garden in Panama and fruited there first, and it was ten years before their nuts were allowed into this country. The Malay dwarfs were kept in a screened cage for years. This was on account of the coconut Bud Rot which had appeared in south Florida and it was feared it might wipe out the plantings of coconuts entirely. But the disease had been found to require more moisture than we have, and our soil conditions proved unsuitable for its spread, so the fear of it had subsided. Still, it was with some trepidation that I wrote to the Chief of the Plant Quarantine and wondered if ten years of quarantine in Panama would be required, but the reply read: "You are informed that seeds of palms, regardless of their kind, may be imported under your nursery stock permit 4199 . . . we are sending a copy of this to Mr. J. V. Gist, in charge at the port of Miami."

So the coast was clear, and I wrote to Mr. Jordahn, Superintendent of the Fairchild Garden, to forward my letter to Prof. Curran, together with the official tags of the Plant Quarantine Bureau which would ensure the entry of the nuts.

Two months elapsed, then came the reply, written the day after mine had arrived, which had taken 39 days to reach Manila.

"I am a wretched correspondent but love to be of service in the introduction of plants. . . . have had difficulty in locating the barrios mentioned by Dr. Swingle. Have sent my son this

A Makapuno coconut cut open, showing how the soft contents can be raised like thick syrup on a spoon. This "meat" of the Makapuno is most highly prized by the ice cream and candy makers of Manila, who pay a special price for the nuts and declare they make the most delicious ice cream in the world.—A Loomis photograph.

morning to the only barrio of this name listed in an adjacent province. I will appreciate it if you can find out the province in which the barrio mentioned by Dr. Swingle is located; the barrio of Ilog. If you cannot locate the province, at least the island. Always glad to hear from you and hope someday to visit Florida and see the Gardens."

To this I replied: "It is a pleasure to feel that one of the Old Guard who loves to introduce plants for the fun of the thing, is at the other end of this line and that in a few days now I can get to him word of the whereabouts of the plantation of the makapuno coconut palms. In the old days when Lyon used to write me his characteristic letters, it took ages to hear from him. 'The universal highway overhead' as dear old Langley used to call it, is now open, and the transfer of plants is a different procedure." Then I gave in detail the location of the plantation belonging to Don Miguel de la Rama at Ilog.

The months passed and not until February 15th, 1939, did I hear again from the Currans. Then Prof. Curran's son Hugh, Junior, wrote: "We have located de la Rama and his makapuno plantation . . . but the man himself remains elusive as a needle in a haystack. Incidentally, makapuno nuts are so in demand here that the trees are kept stript of nuts. By shipping the nuts in March on a ship taking the southern route there should be no danger to them from cold." Another long wait. Then an explanatory letter from Hugh Junior.

"The coconuts left the 17th of April on the "Tai Ping Yang" of the Barber Wilhelmsen line. I saw personally to the stowage of the boxes and hope the assurance given by the mate as to the coolness of the place selected will turn out to be O.K. The boxes were directed to Montgomery in New York as per directions. The Bureau of Plant Industry here inspected and fumigated the nuts and boxes before they left so that there

should be no trouble in New York. Eight makapunos, 4 in the husk and 4 out, were packed in a separate box and placed in the cigar room of the ship, which is kept at about 38° F. I understand that the makapuno will seldom keep over three weeks at ordinary temperatures, so hope the coolness of the cigar room will keep them fresh until they reach you. One hundred nuts from makapuno-bearing clusters of makapuno-bearing trees and 24 coco ninos (tiny coconuts not over four inches through used for dringing purposes and for use in carving) make up the rest of the shipment."

"You will be glad to learn that I was able to get the nuts from de la Rama's plantation. My trouble in locating him seems to have been due to: (1) the fact that the name of Barrio Ilog has been changed to Santos Angel; (2) that de la Rama lives in San Pablo; and (3) that a million dollar fire razed a large part of San Pablo last August, including de la Rama's home. In spite of his name he is a full blooded Filipino, speaks no English and but little Spanish. He was very obliging, even to the extent of telling me that it was not enough to get a nut from a makapuno-bearing tree, but to be more certain of getting another makapuno-bearer, it had to be from a cluster bearing a makapuno nut. Hence all the nuts sent to you were so obtained."

Then followed a disparaging fling at the makapuno. "Roberts of the National Geographic Society went to the plantation with me and took pictures of the harvest of the nuts as well as of the inside of a makapuno and non-makapuno nut. Whether the contrast can be shown pictorially remains to be seen, but will let you know. Roberts doesn't think much of the taste of the makapuno—neither do I."

I retorted in my next to Hugh, Jr. "I am discounting this statement of yours for I know nothing of either of you fellow's judgment in coconut flavors. I know of many people who will not eat a coconut at all and hosts of them will spit out a splendid flavored mango, so this statement of yours does not worry me. We will use the makapuno in quite a different way perhaps than you do. I understood that it made delicious ice cream if properly sweetened. I am writing to Col. Montgomery and hope to hear that his Office has caught the shipment and is sending it down.

But, though I scoffed at the thought of this new coconut not being of superior flavor I was worried just the same, for it was disconcerting to have a man from the Geographic and the man who shipped them speak so of their taste. It was with some misgivings that, when they were delivered at Hugh Matheson's residence on June 6th I staged a makapuno tasting party. The group included Mr. Jordahn, Harold Loomis, Allen Williams, Marian and Miss Pauline Corley of the Miami Herald; not forgetting Hugh's little black spaniel.

The normal nuts, which we hoped would grow into makapuno-bearing trees came through pretty well, but of the makapunos sent in the cool room all but one had rotted.

As we stood there, watching the opening of this one precious nut I think we all felt the drama of the occasion—although I must confess that the taste was a dissapointment. Hugh admitted that "at least there is nothing objectionable about the flavor." One of the group said he "kept tasting the stuff to see if it had any flavor and it hadn't." Marian pointed out that the texture was fine and she felt some people might eat this soft meat whereas they could not eat that of ordinary coconuts.

Of course I liked it. I figured out that probably this nut was the youngest of the lot, possibly not mature when picked, and while it kept better, had only a semblance of its normal taste.

"As it stands, however," I wrote Curran, "I deem it a great acquisition although I dare not prophesy just how popular it will become or how wide will be its use. For candies I should think it might be far superior to the ordinary coconut."

The shipment had taken fifty days enroute, which I thought then was a short time when I compared it with my early shipments from the Orient which sometimes took three months and then occasionally arrived with many of the plants dead. I recall one ill-fated shipment from Italian Somaliland which a courteous Officer of the Italian Army ordered for us. It was during the first world war. After eight months it reached Washington. It consisted of two tons of nuts of the "Yeheb," a desert shrub. Dr. Galloway had the whole shipment examined but could not find a single live nut. Captain Vanutelli had an idea we wanted "a lot" of them. Nowadays the air mails could bring us a handful of the nuts in a few days.

The bulk of the shipment of 100 nuts from makapuno-bearing trees together with 24 nuts of the variety Nino (the small nut) was sent to Mr. Matheson's plantation on Key Biscayne, but a few of each were planted on the Montgomery estate and five makapuno-bearers and four Ninos went to the Chapman Field Garden. The bulk of the shipment was kept in one planting in order to increase the chances of discovering which would be makapuno-bearers.

In my letter of June 15th, 1939, in which I told Hugh Curran, Jr., of the safe arrival of the shipment I find the following:

"I hardly know whether to tell you that I am thinking seriously of making a visit to the Philippines this coming fall. My plans are all in the air still but I would of course want to see your parents and you, did I succeed in getting to the great archipelago. These plans are so tentative

Hugh Matheson (right)and David Fairchild tasting the first Makapuno coconut to be born in Florida, seven years after the arrival of the first Makapuno-bearers from the Philippines. The nut was produced on Col. Robert H. Montgomery's Estate.—Photograph by Harold Loomis, October 1946.

that I must ask you not to broadcast among any of my acquaintances there that I am coming."

With the Fairchild Garden Expedition to the Philippines and the islands of the Great East in Anne Archbold's Yacht "Cheng Ho," the members of the Garden Association are familiar. The above reference is the earliest mention of it I have come across in my files.

Events came fast after this was written and the next reference I find to the makapuno is in a letter to Hugh Matheson from the Manila Hotel in Manila on October 14th. "Don't be deceived about the Makapunos. Don't think they are of only incidental value for I assure you they are worthy of your individual attention. They are a great novelty and certain to be appreciated by the Miami public once they set eyes on them. I say this after eating two dishes of the most delicate and delicious coconut ice cream I have ever tasted, made of the soft, glistening meat of the makapuno coconut. This ice cream has its own reputation and is called makapuno ice cream. The specimen of makapuno nut we opened on your lawn bears only a faint resemblance to a fresh makapuno nut such as I have here on the table before me."

"We landed here a few days ago and I began at once asking about the makapuno coconut and its uses. On the train I met a pretty Philippine lady who told me about a little restaurant in Manila which specialized in the makapuno coconut ice cream but among the American residents I discovered no one who had any knowledge of the special kind of coconut. Yesterday, however, the waiter in this great caravansery told me that on special occasions makapuno ice cream was served to hotel guests."

"It was not until today that I got time to visit the 'Selecta' restaurant and there found posted among the list of the various ices manufactured, such as avocado, mango, grape fruit, a purple yam, vanila, etc., the MAKAPUNO in large letters. The little Filipino woman who owned the place knew all about the nuts and offered to have a fresh nut cut open. When her assistant

brought it to me I realized that what we had seen when we opened that specimen on your lawn was a poor imitation of the real fresh nut. The cavity was completely gone and in its place were masses of shining white 'meat' surrounded by a milkwhite juice which was somewhat sticky. Alone and with no sugar added it is not as strong in flavor as the ordinary coconut but when the little woman put before me a fresh dish of the makapuno ice cream I realized that never before had I seen such coconut ice cream. In smoothness and brilliancy and softness there is no equal to the makapuno. I feel safe in predicting, dear Hugh, that in the course of time when the people of south Florida come to know of the makapuno-bearers they will want them in their yards and will pay fancy prices for them."

"All honor to my friend Walter T. Swingle for suggesting their introduction and to young Curran of Los Banos here for sending them in such shape that they have lived and, of course, to you for making it possible. I expect to see much of the Currans here and they will be glad to help us get palm seeds and other kinds of seeds for the Fairchild Tropical Garden there in Coconut grove."

"So again, dear Hugh, I am pleased with this joint effort of ours to improve the living conditions of those who shall live after us there in Florida."

When Marian and I came down into the long hall of the Manila Hotel the morning after we arrived, there were Professor Hugh Curran and his son Hugh, waiting to invite us to stay in the Bahay Kubo on the Campus of the Forestry School at Los Banos; the utterly charming bamboo and nipa palm thatched cottage beside a rushing mountain stream on the edge of a tropical forest; a house built by the Chief of the Forestry Service, Florence Tamesis.

In "Garden Islands of the Great East" I have told how our friendship with the Currans deepened and of our many collecting trips with them, including one to the plantation from which our makapuno nuts were sent. And then we came home and the months passed, and one day I picked up the paper and saw that on the very spot on the shore where I took a photograph of the superb cone of Mt. Mayon in the Mayon National Park, a company of Japanese troops had landed and began their brutal invasion by firing at the unsuspecting people who went out to greet them. War was on!

The complete darkness of the years that followed shut out our friends from our view and it was not until they came back to America and visited us on The Kampong in 1945 that we heard the details of their three years of imprisonment and the heroic struggle they had made to keep alive and how their knowledge of native vegetables and their skill in growing and cooking them had saved their own and many other prisoners' lives.

They hid in the forest for months but were captured an spent the rest of the three years in a barbed wire enclosure within sight of the Forestry School and their own bamboo cottage home. The Japanese burned almost all the buildings on the Campus as they retreated. Everything which was dear to the Currans was destroyed, but the entire family managed to get back to America. Professor Curran is now in the forests of Venezuela with Dr. Pittier while Mrs. Curran waits for him in Petersburg, Virginia. Hugo, as we came to call Hugh Junior and Howard, have returned to the Philippines with their wives; Hugo to a pineapple plantation at Bukidnon in the south island of Mindanao, Polly and her husband are in Key West,—a scattered family.

But while all these horrible, bloody, human hates and animosities were wrecking Manila and destroying the Bureau of Science which Merrill and his associates, American and Filipino, had taken a quarter of a century to build up, the makapuno bearer coconuts were quietly growing in Coconut Grove under the care of Allen Williams on Biscayne Key, A. C. Jordahn on the Palmetum and T. B. McClelland at Chapman Field. They grew as well as the ordinary coconuts around them and one could say they waited for Hugo, their introducer, to visit them, for not until he came did we know that we had any real makapuno-bearers.

He and Marie, whom he had married in the concentration camp, were guests on The Kampong when he came in one morning from Colonel Montgomery's place and shook a coconut excitedly in my face.

"Here's a makapuno! There's no milk in it; I can shake it and I dont hear the liquid swirl around inside it. There's no doubt about it. Its the true makapuno alright."

My instinct to record the event photographically made me reach for the telephone.

"Is Mr. Hugh Matheson in town?"

"Yes, but he has just left for his office."

"Can't you catch him there and tell him we want to stage a photograph on his front lawn of Hugo Curran and the first makapuno coconut to ripen in America, and of course he has to be present."

He came, bringing Allen Williams. And soon we had some of the same group who had witnessed the tasting of the nuts sent in six years before.

In the basement of the Matheson house Hugo opened the nut and we took it out to the same spot on the lawn where, on June 6, 1939, Hugh Matheson and I had been photographed holding halves of the newly arrived makapuno nut; Harold Loomis who had taken that picture, with the same camera, took us again in the same pose. And curiously enough the little black spaniel which had watched our performance in '39 was

Three of the Plant Introducers of the Makapuno-bearer coconut palms from the Philippines. David Fairchild, who wrote the letters; Hugh Matheson, who financed the introduction, and Hugo Curran (on right), who shipped the nuts in 1939. He holds a "Coco Niño," a small fruited variety introduced at the same time. It is used by wood carvers.—Photograph by Harold Loomis on same spot where seven years before he made one of an imported Makapuno nut. The black spaniel was witness of both events.

there too. Then we posed another picture with Hugo holding a coco nino in his hand.

The flavor of this makapuno fresh from the palm proved a very different thing from that of the stale, imported nut, but even so, Hugo and I realized that this was not the proper kind of test to subject it to. It was something like trying to find out what kind of a pie crust a certain flour would make by tasting the flour itself; the raw flour. We should find someone to make it into ice cream.

At last a makapuno nut had been born on the American Continent, and while by rights, perhaps, the fruit should have been one from Mr. Matheson's plantation, and Williams was disappointed, they both took as much interest in it as though it had come from the Key.

And now that we have the makapuno, it will be a matter of interest and importance for those who may in after years make plantings of it, to know its peculiarities as they have been worked out by the Filipino scientist, Torres; the mode of its inheritance and the method of its propagation. For unlike most plants, the seeds, which in this case are the nuts, are not able to germinate; they will not grow if planted. They are imperfect nuts produced by palms which have inherited the character of producing them along with the ability to bear normal nuts which will grow. They might be roughly compared to coreless apples or seedless oranges, or more closely with seedless dates; that are no seeds in any of these for us to plant. We must grow the trees which produce them by taking buds or cuttings from them. Most persons know that this is true about our common fruit trees, but perhaps few understand that the date palm when young, grows a bunch of suckers at its base and that these, when planted produce almost exactly the

kind of fruits that the parent palm does, even if they should happen to be seedless.

An Arab chief who has in his yard a date palm which bears exquisitely-flavored or unusually large or seedless dates and doesn't want any one else to have one like it, may give the fruits away, but he will guard the suckers at its base carefully or perhaps even destroy them. He knows that when his pet palm gets to be a dozen or so years old it will probably stop producing suckers and be the only one of its kind in the world.

But the coconut, as I have said, produces no suckers. It has only one bud, a large terminal one and will die if this is cut off. No way has been found to propagate it therefore except through its nuts. The only way now known to get makapuno-bearing palms is to plant all the normal nuts from clusters that have among them some of the solid makapuno nuts. "Makapuno" is a Tagalog name meaning filled.

Professor Torres' studies were made on plantations that had been started nearly half a century before, and the records of the plantings, naturally enough, were not complete.

The particular plantation, that of Don Miguel de la Rama, the one from which Hugo got the nuts for us, contained 107 makapuno-bearers and 46 ordinary coconut palms. Professor Torres made a plat of it, but when it came to bagging the flower clusters in the tops of fifty-foot tall palms and crossing or self-pollinating them, he found this too difficult to arrange for. It is true that an expert coconut palm climber, like the toddy sap gatherers of Ceylon, will climb a fifty-foot palm and slide down it in thirty seconds with only the help of a rope loop two feet across, but the effort is fatiguing, and Professor Torres had not the means of making such a pollinating experiment as might clear up certain questions more definitely than his statistical tables were able to do.

He assumed that; "The makapuno type of coconut is a mono-Mendelian character, therefore, the genotypic segregation of nuts would be in the proportion of 1 normal nut to 2 hybrid or Heterozgous nuts and 1 recessive, a makapuno; the familiar 1:2:1 ratio (1 MM 2 Mm 1mm). The first two biotypes (MM and Mm) as regards germinibility are normal, but the MM will develop into a tree producing only normal nuts and each of the second biotype, Mm, will develop into a makapuno-bearing tree. Theoretically, therefore, the mono-Mendilian ratio of the normal and the makapuno-bearing trees respectively, must be existing in the established makapuno plantations."

In confirmation of this he says that makapuno planters seem to agree that for every one of their palms that bears normal nuts they will have two makapuno-bearing ones. One owner of a forty-year-old plantation told him that two thousand of his three thousand trees had actually borne makapunos.

Professor Torres closes his paper with suggestions of how to establish a plantation of makapuno-bearers. Select nuts from *bunches* in which you know there are makapuno nuts. Plant them in groups of two or three to the hill, placing the hills forty to fifty feet apart each way so that later the normal trees which bear no makapunos can be removed without any considerable loss in the production of the plantation.

There is, he thinks, a good chance that self-pollination may be more likely to occur if the trees are heavily manured or fertilized and the flower clusters encouraged to appear in overlapping succession. He thinks that artificial hand pollination, using pollen from palms that are bearing makapuno nuts, preferably sister trees, would be a less practical method. If one is thinking of old palms, forty feet high, artificial pollination would appear costly, although the date growers of California, with their pollen blowers might not think this method so difficult. Whether the fact has been really established beyond dispute that "cross pollination of the makapuno-bearing trees by the normal trees *tends* to reduce the production of makapuno nuts in the former," and to what extent self-pollination will increase their number may require further study to prove.

There seems to be one more possibility, Torres thinks, of getting pure makapuno-bearers. The makapuno nuts appear to have embryos that are normal but that, for some reason, are inhibited from germinating, and these might be taken out and led to germinate in a nutrient solution and grown into good, vigorous trees which would bear only makapuno nuts. This procedure has been successful with some other plants.

There is an illustration in Torres article of piles of different sized makapunos, showing that they vary like other nuts. He also gives a water-color painting of an ordinary coconut as it looks when germinating, dark brown husk and deep green shoot; two nuts from makapuno-bearing palms ,with light green shoots and a makapuno nut which, of course, has not germinated at all. The inference is that the color of the young shoots of the nuts from the makapuno-bearer are lighter in color, although he does not expressly say so. If they are, this character may aid in picking out probable makapuno-bearers for field planting.

At all events, the makapuno coconut is now here, and if people like the ice cream and candies to be made of its soft meat its bearers may be widely planted, and this story of their coming to America be read with interest. It will, of course, be some years before there are groves of these bearers here, but in any event the Philippine Island plantations may be able to ship iced makapuno nuts to our shores.